Serial No. : 10/814,902
Applicants : Eberhard Schroder and Giuliano Persico
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AMENDMENTS TO THE DRAWING

The Office Action objects to Figure 1 of the application for failing to label the blocks of the drawing with functional names.

Pursuant to 37 C.F.R. §1.121(d), an amended Figure 1 labeled "REPLACEMENT SHEET" is attached to the present Response. Figure 1 has been amended to now include the labels "Electric Motor", "Transmission", "Chain Wheel", "Articulated Chain", "Load", "Power End Stage", and "Electronic Damper."

The amendments are fully supported by the application as filed. Accordingly, no new material is added. Review, approval and entry of this drawing change to FIG. 1 are respectfully requested.

REMARKS

Applicants acknowledge the Examiner's review of the specification, claims, and drawings. In light of the above amendments and following remarks, Applicants respectfully request reconsideration of the present application. The amendments and remarks presented herein are fully supported by the application as originally filed. No new matter has been entered.

STATUS OF THE CLAIMS:

Claims 1-29 were pending in the application. Claims 1, 3, 17-19 and 23 have been amended and claims 30-33 have been added. Claims 2, 8, 13 and 14 have been cancelled. Claims 1, 3-7, 9-12 and 15-33 remain pending in the application.

CLAIM TO FOREIGN PRIORITY:

The Office Action notes that papers submitted under 35 U.S.C. §119 have been made of record in the file. However, the Office Action advises that submission of a certified copy of the priority document is necessary to receive foreign priority.

Included with the original application filed on March 31, 2004 was both a claim of priority to German patent application Serial No. 103 14 724.1, filed on March 31, 2003, as well as a certified copy of the German patent application to which priority is claimed. Applicants note that the U.S. Patent and Trademark Office Patent Application Information Retrieval (PAIR) database discloses both the claim of priority and the certified copy of the German patent application as being on file.

Therefore, Applicants respectfully request acknowledgement of receipt of the certified copy of the German patent application and the granting of the priority claim.

INFORMATION DISCLOSURE STATEMENT:

The Office Action notes that references submitted on an IDS without English language translations were not considered. The three references that were not considered in the returned PTO-Form 1449 are EP 0 798 488A, EP 0 734 993A, and DE 40 38 981A.

Applicants filed a supplemental IDS on January 24, 2005. The PTO-Form 1449 accompanying the IDS listed nine references, all of which were cited in a European Search Report conducted in regard to corresponding European Patent Application No. EP 04 00

6657. A copy of the European Search Report was included with the supplemental IDS submitted on January 24, 2005. In regard to the above noted three references, the European Search Report indicated their relevancy by way of the letter "A" in the column titled "Kategorie" next to the listed references.

MPEP §609(III)(A)(3) states that the requirement for a concise explanation of relevance for non-English information listed on an IDS, where the information was cited in a search report by a foreign patent office in a counterpart foreign application, can be satisfied by submitting the search report if the relevancy of the cited references is indicated on the search report by an "X", "Y", or "A".

Applicants submit that the supplemental IDS filed on January 24, 2005, complies with MPEP §609 and, therefore, respectfully request acknowledgement of the above noted three references.

On March 31, 2004, Applicants filed an IDS and accompanying PTO-Form 1449 listing five German references along with copies of those references. An initialed copy of the PTO-Form 1449 was not returned with the Office Action. Applicants respectfully request consideration of the information cited in the IDS and return of an initialed copy of the PTO-Form 1449.

CLAIM REJECTIONS UNDER 35 U.S.C. §103:

The Office Action rejects claims 1-16 under 35 U.S.C. §103(a) as being unpatentable over Applicants' discussion of German reference DE 1 531 307 (the '307 reference) in view of U.S. Patent 6,281,650 to Yutkowitz, and further in view of U.S. Patent 5,719,480 to Bock et al. The Office Action takes the position that it would have been obvious to improve the chain wheel system of the '307 reference by Yutkowitz in order to control the chain wheel system in a stable manner. The Office Action further takes the position that it would have been obvious to incorporate the teachings of Bock into the combination of Yutkowitz and the '307 reference to implement stochastic variable control.

Applicants respectfully note that claims 2, 8, 13 and 14 have been cancelled, thereby eliminating the rejection with respect to these claims. Claims 3-7, 9-12, and 15-16 ultimately depend from claim 1. Therefore, the rejection of these claims will be addressed below with reference to claim 1.

Applicants respectfully traverse the rejection. With respect to claim 1, claim 1 has been amended to more clearly define Applicants' invention, which now calls for:

> Method for stabilizing the motion of an articulated chain of a chain block to impede the formation of resonance oscillation of the chain, in which an articulated chain is passed across a polygonal chain wheel with non-uniform pitch, said chain wheel driven by an electric motor, said method comprising:
>
> actuating the electric motor by an electronic damper; and
>
> superimposing a dampening actuating variable on the velocity of the chain wheel wherein the dampening actuating variable produces a change in the chain velocity so as to impede formation of a resonance oscillation wherein the dampening actuation variable is at least one chosen from a periodic variable and a stochastic variable, wherein a first input variable and a second input variable are supplied to said electronic damper, and wherein the dampening actuating variable is computed in said electronic damper from the first and second input variables and transferred to the electric motor.

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation either in the references themselves or in the knowledge generally available to one of ordinary skill in the art to modify the reference or combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference or references when combined must teach or suggest all the claimed limitations. The teaching or suggestion to make the claim combination and reasonable expectation of success must both be found in the prior art and not based on Applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). *See* MPEP § 2143.

Applicants submit that the method for stabilizing the motion of an articulated chain of a chain block to impede the formation of resonance oscillation of the chain is not obvious over the '307 reference in view of Yutkowitz and Bock. There is no motivation or suggestion to combine the references and any such combination would not provide a solution to the problem sought to be resolved by the present invention.

The present invention addresses the problem of resonant oscillation of an articulated chain passing over a polygonal chain wheel. FIG. 1 of the '307 reference, reproduced herein, illustrates an embodiment of an articulated chain and polygonal chain wheel. As the chain rotates about the polygonal circumference of the chain wheel, as noted on page 1 of the present application, "the effective radius of the chain wheel changes as a function of angle, and thus the speed of the chain periodically fluctuates . . . even [] when the electric motor has

constant speed. This entails an unstable running of the chain, a continual pulsating load on the chain block, and possible troublesome resonance effects." The present invention overcomes the problems of periodic fluctuations by the computation of a dampening actuating variable within an electronic damper which is then used to produce a pulsating change in the rotary speed of the polygonal chain wheel.

35c 3-12 15 31 307 O.T: 22.1.1970 1531307

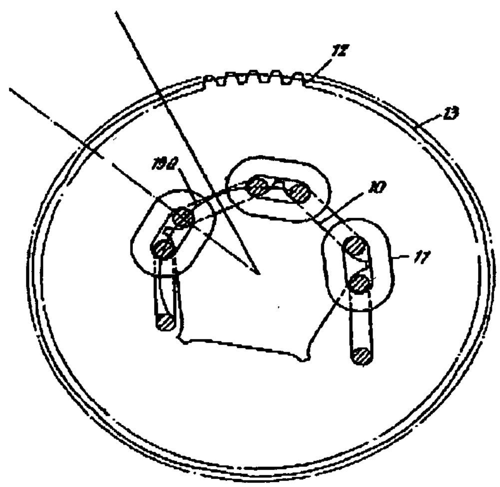

FIG.1 X

In contrast, Yutkowitz involves machine tools that utilize ballscrews or other threaded drives, rack and pinion systems, or linear motors to control the translational motion of a workpiece and/or tool. Specifically, Yutkowitz addresses the problem of disturbances present in machining, such as variations in the material being machined or vibrations from nearby equipment, that may affect the processing and resulting quality of the workpiece. Yutkowitz, therefore, provides velocity and/or position tuning loop controllers for servo-controllers of such machines to control the speed and/or position of the translational motion of a workpiece and/or tool during machining. (Col. 7, lines 24-61).

As will be better understood from the discussion below, Yutkowitz discloses a tuning control system for machining tools that <u>reacts</u> to and <u>compensates</u> for disturbances, resulting from material variations or equipment vibrations. Because these disturbances are necessarily random and non-predictable, it should be evident that Yutkowitz cannot teach or suggest an electronic damper that computes a dampening actuating variable and <u>proactively</u>

superimposes the dampening actuating variable on the polygonal chain wheel of a chain block, as taught by the present invention, to impede formation of a resonance oscillation. Therefore, Applicants respectfully submit, there is no motivation to combine Yutkowitz with the '307 reference.

The Office Action takes the position that Yutkowitz teaches a method comprising superimposing a dampening actuating variable on the velocity of a moving part to produce a change in the velocity of the machine axis so as to impede formation of a mechanical resonance and oscillation. However, this position is incorrect because Yutkowitz actually teaches, as understood from FIG. 1, providing both a velocity command 1 from a computer (not shown) and a feedback velocity signal 12 from a measured velocity 10 to a summer 2 as a tuning control loop to detect and compensate for disturbances. That is, an actual velocity is measured and provided to a summer to maintain or tune the machining operation at the desired input velocity command. As such, Yutkowitz neither teaches nor suggests the providing of a computation of a dampening actuating variable within an electronic damper which is then used to produce a pulsating change in the rotary speed of a polygonal chain wheel as taught by the present invention.

Furthermore, the written specification of Yutkowitz teaches away from the computing of a dampening actuating variable within an electronic damper as taught by the present invention. Yutkowitz states:

> The present invention utilizes direct measurements . . . without the imposition of a mathematical model. This is to be contrasted with other tuning methods in which a mathematical model of the machine is constructed . . . and [] measurements may be performed to estimate one or more parameters of this presumed mathematical model. The model is then used to predict the values of parameters to provide adequate tuning of the machine . . . [and] is limited by the accuracy and flexibility of the presumed model.
>
> In contrast, the present method uses only direct measurements of the machine under various operation conditions to elucidate directly the behavior of the control system. (Col. 15, lines 20-34).

That is, Yutkowitz does not involve the mathematical computation of parameters to provide tuning. In contrast, the present invention provides for the computation of a dampening actuating variable within an electronic damper which is then used to produce a pulsating change in the rotary speed of a polygonal chain wheel.

Yutkowitz, therefore, merely provides a reaction based on actual measurements taken <u>after</u> a disturbance has occurred. The present invention, however, employs a mathematical

computation beforehand to avoid the effects of a continual pulsating load resulting from the chain coming off the polygonal circumference of the chain wheel.

The incorporation of the teachings of Bock into the combination of the '307 reference and Yutkowitz also does not teach or suggest the computation of a dampening actuating variable within an electronic damper which is then used to produce a pulsating change in the rotary speed of a polygonal chain wheel.

Bock describes the use of a neural network as an adaptive controller for a robot control system having several degrees of freedom (FIG. 5 and col. 8, lines 50 ff) to improve movement along a given path even after altered robotic dynamics, such as by wear, through adaptive compensation and relearning. The Office Action takes the position that Bock "teaches about a parametric control device that utilizes a stochastic variable in order to control a motor (col. 10, lines 48-59)." However, the cited section relates to the teaching process of an artificial neural network through a series of exploratory movements and observations of performance errors in which the artificial neural network is modified by a stochastic process depending on the size of the performance error. The stochastic process taught by Bock, therefore, does not relate to the computation of a dampening actuating variable within an electronic damper which is then used to produce a pulsating change in the rotary speed of a polygonal chain wheel.

Regarding claim 2, the limitations of which have now been included in currently amended claim 1, the Office Action takes the position that the Yutkowitz PI compensator 3, illustrated in FIG. 1, shows an electronic damper used to actuate the electric motor. The PI compensator of Yutkowitz, however, actually functions to overcome the affect of increased inertia from faster translational motion and/or greater masses of the moving workpiece or tool that would otherwise lower the responsiveness of the velocity controller. (Col. 11, lines14-25).

Regarding claim 3, the Office Action takes the position that the Yutkowitz command velocity 1 and feedback velocity signal 12, as shown in FIG. 1, disclose the first input variable of the nominal rotary speed of the chain wheel and the second input variable of the actual angle of the chain wheel of the present invention, with the command velocity 1 and feedback velocity signal 12 being used to compute a dampening actuating variable in the PI compensator 3. This position is incorrect, however, at least for the reason that the feedback velocity signal 12 is merely the inverted signal of the actual velocity and not equivalent to an

actual angle of the chain wheel. The feedback velocity signal, therefore, is not used to compute a dampening actuating variable that is then used to produce a pulsating change in the rotary speed of a polygonal chain wheel, but is merely summed to tune the machining operation to the desired input velocity command.

Regarding claim 4, the Office Action takes the position that the Yutkowitz torque control loop 13, illustrated in FIG. 1, discloses the use of a detected angle to calculate torque and, thus, inherently calculate the dampening force. However, as discussed in Yutkowitz and understood from FIG. 1, a torque command 7, i.e. an electronic signal in the form of current, is processed by current controller 13 to merely produce an actual torque 8 that drives an axis 5 by means of a ballscrew. (Col. 11, lines 54-59). The current controller 13, therefore, does not receive a detected angle as an input to calculate torque, nor does it calculate a dampening force, inherently or otherwise.

Applicants submit that the method for stabilizing the motion of an articulated chain of a chain block to impede the formation of resonance oscillation of the chain of claims 1, 3, and 4 is not obvious over the '307 reference in view of Yutkowitz and Bock for the reasons discussed above and respectfully request a Notice of Allowance of claim 1, as well as allowance of claims 3-7, 9-12, 15, and 16, which depend from claim 1.

Regarding claim 17, claim 17 has been amended to more clearly define Applicants' invention, which now calls for:

> A chain block, comprising:
>
> a chain led across a polygonal chain wheel with an electric motor acting on the chain wheel; and
>
> an electronic damper hooked up in front of the electric motor, said electronic damper controlling said electric motor including superimposing a dampening actuating variable on the velocity of said chain wheel, wherein a first input and a second input are provided to said electronic damper and the dampening actuating variable is computed in said electronic damper from the first and second inputs;
>
> wherein the dampening actuating variable produces a change in the chain velocity so as to impede formation of a resonance oscillation, wherein the dampening actuation variable is at least one chosen from a periodic variable and a stochastic variable;
>
> whereby formation of a resonance oscillation of the articulated chain is impeded.

The Office Action takes the position that claim 17 is also unpatentable over the '307 reference in view of Yutkowitz and Bock. Specifically, the Office Action takes the position

that Yutkowitz teaches an electronic damper from the velocity control loop 26 of FIG. 1 and servo-controller 412 of FIG. 10 hooked up in front of and controlling an electric motor including superimposing a dampening actuating variable on the velocity of a movable part 408 of FIG. 10.

However, the position of the Office Action in regard to claim 17 is incorrect for at least the reason that neither the velocity control loop 26 of FIG. 1 nor the servo-controller 412 of FIG. 10 teach or suggest an electronic damper of the present invention that computes a dampening actuating variable and superimposes the dampening actuating variable on the polygonal chain wheel of a chain block. As stated in Yutkowitz, "[r]eference number 26 refers to the velocity control loop having command velocity, 1, as input and actual velocity, 9, as output . . . with a single input and a single output corresponding to command velocity and actual velocity respectively." (Col. 12, lines 48-54). As discussed above, velocity control loop 26 merely functions to measure an actual velocity that is provided to a summer to maintain or tune the machining operation at the desired input velocity command.

Regarding servo-controller 412, FIG. 10 of Yutkowitz discloses a motion control system comprising a computerized control system 410, of which the servo-controller 412 is a part. In similar fashion to velocity control loop 26, the control system 410 receives inputs from actual measurements of velocity, position, and angle, which are then fed back to servo-controller 412 and compared to input position and velocity commands to tune the system to the desired position and velocity parameters and thereby overcome disturbances, such as due to material variations or machine vibrations.

As above, the incorporation of the teachings of Bock into the combination of the '307 reference and Yutkowitz also does not teach or suggest the computation of a dampening actuating variable within an electronic damper which is then used to produce a pulsating change in the rotary speed of a polygonal chain wheel because the stochastic process taught by Bock does not relate to the computation of a dampening actuating variable within an electronic damper.

Regarding claim 18, the Office Action takes the identical position with regard to claim 3 above. Applicants argue, as above, that this position is incorrect at least for the reason that the feedback velocity signal 12 is merely the <u>inverted signal of the actual velocity</u> and not equivalent to an actual angle of the chain wheel.

As discussed above, Yutkowitz discloses a tuning control system for machining tools that reacts to and compensates for random and non-predictable disturbances. In contrast, the present invention provides an electronic damper that computes a dampening actuating variable and proactively superimposes the dampening actuating variable on the polygonal chain wheel of a chain block to impede formation of a resonance oscillation.

Applicants respectfully submit that the chain block of claims 17 and 18 is not obvious over the '307 reference in view of Yutkowitz and Bock for the reasons discussed above and respectfully request a Notice of Allowance of claim 17, as well as allowance of claims 18-29, which depend from claim 17.

NEW CLAIMS:

Claims 30-33 have been added and are now pending in the application.

Independent claim 30 includes all of the limitations of original claims 1-4. Claim 30 is as follows:

> Method for stabilizing the motion of an articulated chain of a chain block to impede the formation of resonance oscillation of the chain, in which an articulated chain is passed across a polygonal chain wheel with non-uniform pitch, said chain wheel driven by an electric motor, said method comprising:
>
> actuating the electric motor by an electronic damper;
>
> superimposing a dampening actuating variable on the velocity of the chain wheel wherein the dampening actuating variable produces a change in the chain velocity so as to impede formation of a resonance oscillation wherein the dampening actuation variable is at least one chosen from a periodic variable and a stochastic variable, wherein a nominal rotary speed (n_{Soll}) of the chain wheel is supplied to said electronic damper as a first input variable and an actual angle (ψ_{rad}) of the chain wheel as a second input variable, wherein the dampening actuating variable is computed in said electronic damper from the first and second input variables, the dampening actuator variable being transferred to the electric motor in the form of a dampened rotary speed (n^*_{Soll}); and
>
> computing a dampening force (F_D) as the dampening actuating variable in the electronic damper, said dampening force proportional to the amplitude of velocity fluctuation ($\dot{y}_m$) of the load, and it is calculated from a sensor-detected actual angle (ψ_{rad}).

Applicants respectfully submit that the method of claim 30 is patentably distinguishable over the prior art of record. Claim 30 specifies the use of an electronic damper that receives a nominal rotary speed of the chain wheel and an actual angle of the

chain wheel from a sensor-detected actual angle to compute a dampening actuating variable that is then transferred to an electric motor to impede the formation of resonance oscillation of the chain.

Claims 31-33 depend from claim 30. Applicants submit that claim 30 is not obvious over the cited references such that claims 31-33, are similarly not obvious.

In light of the above amendments and remarks, Applicants respectfully request reconsideration of the present application and a Notice of Allowance of all claims.

Respectfully submitted,
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